HOST-PLANT SPECTRUM OF STRAWBERRY SPIDER MITE[1,2,3]

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ABSTRACT: Eighty six species or varieties of angiosperms from 30 families were evaluated for suitability as hosts for *Tetranychus turkestani* Ugarov and Nikolski, the strawberry spider mite, and were rated as follows: 44.2% excellent, 16.3% acceptable, 8.1% poor and 31.4% unacceptable. The excellent hosts generally were concentrated in the upper middle portion of this subdivision of the plant kingdom, in the Rosaceae, Fabaceae, Malvaceae and their near relatives, but 2 of 4 Graminae and all 5 Cucurbitaceae tested also were excellent hosts.

DESCRIPTORS: Strawberry Spider Mite, Soybean Pests, Spider Mite Host Plants, *Tetranychus turkestani* U. & N.

In Delaware during dry summers, the strawberry spider mite, *Tetranychus turkestani* Ugarov and Nikolski, causes severe injury to soybeans (Simpson and Connell, 1973).

This study evaluates the suitability of a wide range of plants as hosts for *T. turkestani*, and gives information on possible overwintering hosts as well as on hosts from which the mite could migrate to soybeans. Mellott and Connell (1965) reported *T. turkestani* (under the synonym *T. atlanticus* McGregor) from 63 plant species, but said little about their suitability as hosts. Their list included plants reported as hosts in the literature which they were not able to confirm through collections.

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Materials and Methods--86 angiosperm species or varieties from 30 families were studied. Most of these were either potted with their root system intact in the field and transferred to the greenhouse or raised from seed. In the case of a few, which could not be transplanted easily, a leaf, or part of a leaf was evaluated on wet filter paper in a petri dish, a modification of Rodriquez' (1951) technique.

A soybean leaf infested with *T. turkestani*, from a greenhouse colony, was placed on each plant or isolated leaf being tested. The mites which migrated from this material then were allowed to feed for 9 days. The life cycle of this mite is about 8 days at 21° C and 4 days at 27°C (Cagle, 1956). Our tests were conducted at 21° to 38° C so there was sufficient time for completion of at least one generation. At the end of the test period a few leaves were removed from each plant in the immediate area of introduction of the mites and eggs were counted, using a stereomicroscope, on the leaf on which they appeared most abundant. Egg production probably gives an indication of host suitability, since with spider mites there is a direct relation between food uptake and oviposition rate (Boudreaux, 1958).

Results and Discussion--The results of these tests are recorded in Table 1, where the plants are listed according to the classification of Britton and Brown (Gleason, 1963); Gray's Manual (Fernald, 1950) was the source of common names. The plants are rated, according to the number of *T. turkestani* eggs per leaf, in 4 categories; 0 to 4 eggs - unacceptable; 5 to 24 - poor; 25 to 49 - suitable and 50 or more - excellent hosts. Overall, 60.5% appear to be excellent or suitable hosts and the remaining 39.5% poor or unacceptable. Included were 37 of the 63 species from which Mellott and Connell (1965) reported that this mite had been collected; of these, 21, or 57% were found to be excellent or suitable hosts.

Suitable to excellent hosts were found throughout this subdivision of the plant kingdom, but the greatest concentration was in the upper middle portion: the families Rosaceae to Asclepiadaceae. This includes the Fabaceae, or legumes, one of which is the soybean; the closely related Rosaceae; and Malvaceae, the family containing the economically important cotton plant. Sixty-six percent of 29 plants tested in this portion of the Angiospermae were excellent hosts and only 14% were unacceptable. This compares with 33% excellent hosts and 40% unacceptable among 57 plant species less closely related to the soybean. Notable among plant families not so closely related to the soybean, but containing excellent hosts, were two near opposite ends of the hierarchy, the monocotyledon family Graminae with two of four species excellent and the higher dictoyledon family Cucurbitaceae with all five tested being excellent.

Admittedly, the methods used provide only a rough estimate of host suitability. Therefore the host list developed is only a tentative one. We did

not attempt a critical evaluation, since it is probably that fecundity in this spider mite is influenced by many things that we were in no position to control; air temperature and humidity at the leaf surface, fertility requirements of each plant species, age and conditions of prior exposure of plants, to mention a few. However, we believe the study provided a list of plants that we can now follow in nature to determine in what way they may contribute to maintenance of natural populations of *T. turkestani*. We anticipate that natural hosts will be found only among those rated here as excellent, since we know that *T. turkestani* has the ability, when it has no other choice, to maintain a population in the laboratory on plant species that we have never been able to associate it with in nature.

Suitability of selected plants as hosts of *T. turkestani*.

Family and Species	Common Name	Rating [a]
GRAMINAE		
Festuca rubra	red fescue	-
Lolium multiflorum	Italian rye grass	-
Sorgum vulgare cv.	sorghum	+ + +
Zea Mays	corn	+ + +
LILIACEAE		
Smilacina racemosa[b]	false solomon's seal	-
MORACEAE		
Morus alba[b,c]	white mulberry	+ + +
URTICACEAE		
Boehmeria cylindrica[b,c]	bog hemp	+
POLYGONACEAE		
Rumex crispus[b,c]	yellow dock	+ +
CHENOPODIACEAE		
Chenopodium album[b]	lamb's quarters	+
Beta vulgaris	red beet	+ + +
AMARANTHACEAE		
Amaranthus sp.[b]	amaranth	+ + +
PHYTOLACCACEAE		
Phytolacca americana[b,c]	poke	+ + +
AIZOACEAE		
Mollugo verticillata[b]	carpetweed	-
CARYOPHYLLACEAE		
Stellaria media	chickweed	+ + +
Dianthus Caryophyllus	carnation	+ + +
RANUNCULACEAE		
Thalictrum polygamum[b,c]	tall meadow rue	+
LAURACEAE		
Sassafras albidum[b,c]	white sassafras	+
PAPAVERACEAE		
Papaver sp.	poppy	+ + +

CRUCIFERAE				
Brassica oleracea botrytis	cauliflower			-
B. oleracea capitata	cabbage			-
Raphanus Raphanistrum[b]	wild radish		+	+
R. sativus	radish	+	+	+
Lobularia maritima	sweet alyssum			-
Barbarea vulgaris	yellow rocket			-
Matthiola incana	stock			-
ROSACEAE				
Fragaria virginiana[b]	strawberry	+	+	+
Potentilla norvegica[b]	cinquefoil	+	+	+
P. recta[b]	cinquefoil		+	+
Rubus sp.[b,c]	blackberry	+	+	+
FABACEAE				
Trifolium pratense[b]	red clover	+	+	+
T. repens[b]	white clover	+	+	+
T. repens cv.	Ladino clover	+	+	+
T. hybridum	alsike clover	+	+	+
T. procumbens	low hop-clover	+	+	+
Lespedeza intermedia[b, c]			+	+
L. cuneata	lespedeza			-
Arachis hypogaea	peanut	+	+	+
Lathyrus odoratus nanellus	dwarf sweet pea			-
Phaseolus limensis[b]	lima bean	+	+	+
P. vulgaris[b]	kidney bean	+	+	+
Pisum sativum	garden pea	+	+	+
Glycine Max[b]	soybean	+	+	+
OXALIDACEAE				
Oxalis stricta	wood sorrel			-
O. europaea cymosa[b]	wood sorrel			-
EUPHORBIACEAE				
Ricinus communis	castor bean	+	+	+
Euphorbia maculata[b]	eyebane			+
MALVACEAE				
Althaea officinalis[c]	marshmallow	+	+	+
A. rosea	hollyhock		+	+
Malva neglecta	common mallow	+	+	+
Gossypium hirsutum	cotton	+	+	+
UMBELLIFERAE				
Daucus Carota[b]	Queen Anne's Lace	+	+	+
D. carota sativa	carrot		+	+
APOCYNACEAE				
Apocynum cannabinum[b,c]	Indian hemp		+	+
ASCLEPIADACEAE				
Asclepias syriaca[b]	common milkweed	+	+	+
CONVOLVULACEAE				
Ipomoea hederacea[b]	morning glory			-
Convolvulus sepium	hedge bindweed	+	+	+
LABIATAE				
Mentha spicata	spearmint			-
SOLANACEAE				
Solanum tuberosum	potato			-
S. carolinense[b]	horse nettle			-

S. Melongena	eggplant	+	+	+
Lycopersicon esculentum	tomato			-
Nicotiana sp.	nicotiana			-
Petunia sp.	petunia			-
Capsicum frutescens grossum	sweet pepper			-
SCROPHULARIACEAE				
Verbascum Blattaria[b]	moth mullein			-
Veronica persica	bird's eye	+	+	+
PLANTAGINACEAE				
Plantago lanceolata[b]	buckhorn		+	+
CUCURBITACEAE				
Cucurbita maxima	butternut squash	+	+	+
C. Pepo	pumpkin	+	+	+
C. Pepo Melopepo[b]	summer squash	+	+	+
Cucumis Melo	cantaloupe	+	+	+
C. sativus	cucumber	+	+	+
LOBELIACEAE				
Lobelia inflata[b]	Indian tobacco			+
COMPOSITAE				
Zinnia elegans	zinnia			-
Cosmos sp.	cosmos		+	+
Ambrosia artemisiifolia[b]	common ragweed			-
Tagetes patula	French marigold		+	+
Heterotheca subaxillaris[b]	camphorweed			-
Erigeron annuus[b]	daisy fleabane			-
Aster sp.	aster		+	+
Centaurea Cyanus	bachelor's button		+	+
Taraxacum officinale[b]	common dandelion		+	+
Lactuca sativa crispa	leaf lettuce	+	+	+
L. sativa capitata	head lettuce			-
Chichorium Intybus[b]	common chicory			+
Ageratum Houstonianum	ageratum		+	+

a. + + + excellent host, + + suitable host, + poor host, - unacceptable
b. Hosts reported by Mellott and Connell (1965)
c. Evaluated by detached leaf technique

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